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# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

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Date: April 22, 1992  
In reply refer to: H-92-29

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The Safety Board has had a longstanding concern about vehicle occupant protection, especially with regard to restraint systems. Since 1972, the Board has issued safety recommendations to the Department of Transportation (DOT), various States, manufacturers, and advocacy organizations regarding the installation and use of restraints. In 1986, the Board issued recommendations to the DOT and to manufacturers regarding the installation of lap/shoulder belts (also called three-point restraints) at outboard seating positions in passenger vehicles; however, the Safety Board has not issued recommendations regarding lap/shoulder belts in heavy trucks.<sup>1</sup>

In conjunction with a safety study of heavy truck accidents, the Safety Board investigated 182 accidents that were fatal to the drivers.<sup>2</sup> These accidents occurred in eight States between October 1, 1987, and September 30, 1988. The accidents investigated as part of the safety study represent about a quarter of the fatal heavy truck accidents that occurred nationwide during the study period.

Of the 170 vehicles for which restraint availability could be determined, 150 (88.2 percent) were equipped with lap-only belts, and 20 (11.8 percent) had no belts available (none had lap/shoulder belts). Of the 150 belt-equipped tractors, restraint use could be determined in 130 of the cases. Only 10 (7.7 percent) of these 130 fatally injured drivers wore belts at the time of their accidents. Although the remaining 120

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<sup>1</sup> As used in this letter, the term "heavy truck" refers to trucks of greater than 10,000 pounds gross vehicle weight.

<sup>2</sup> National Transportation Safety Board. 1990. Fatigue, alcohol, other drugs, and medical factors in fatal-to-the-driver heavy truck crashes [two volumes]. Safety Study NTSB/SS-90/01 and -90/02. Washington, DC. Volume 1 presents the study and findings; volume 2 summarizes each accident case.

(92.3 percent) fatally injured drivers had belts available, they all were unrestrained.

Of the 10 restrained fatalities, 6 died in crashes that were most likely catastrophic--that is, the accidents were of such severity that adequate crash protection could not reasonably have been provided by countermeasures. Of the remaining four drivers, one died of fire, and another of an apparent pre-crash heart attack. The remaining two drivers died of internal injuries, probably caused by the lap-only belts they were wearing. (In its 1986 study of lap belt performance in passenger vehicles, the Safety Board concluded that lap-only belts provide less crash protection in frontal collisions than do lap/shoulder belts, and that lap-only belts are capable of causing serious injury in the event of a frontal crash.<sup>3</sup>)

As part of a study on the crashworthiness of heavy trucks, researchers at the University of Michigan Transportation Research Institute (UMTRI) selected a subset of the Safety Board's 182 cases for analysis.<sup>4</sup> The UMTRI researchers examined the 121 tractor and tractor-combination cases for which they concluded that adequate information was available to determine the degree of cab crush (although the Safety Board did not collect data specifically for that purpose). UMTRI determined that survivable space was maintained in 42 (35 percent) of the cabs after impact, and estimated that had these drivers been belted, 32 would have survived the crash; however, none of these drivers wore belts and all were killed.

The UMTRI extrapolated this estimate to its Trucks in Fatal Accidents (TIFA) data base of heavy truck accidents. It estimated that during the study period, 155 fatally injured heavy truck drivers (26 percent of those who died nationwide) would not have been killed if they had been wearing seatbelts at the time of the accident.

The estimates made by UMTRI do not include lives of nondrivers that could be saved or the potential for injury reduction attributable to seatbelt use in nonfatal accidents. However, a 1982 study sponsored by the National Highway Traffic Safety Association (NHTSA) examined the detailed files of 77 fatal and nonfatal accidents.<sup>5</sup> That study estimated that the use of available restraints probably would have reduced the level of injury severity for 64 drivers (83.1 percent). Because these tractors likely were equipped with lap-only belts, use of lap/shoulder belts would have resulted in an even greater degree of crash protection.

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<sup>3</sup> National Transportation Safety Board. 1988. Performance of lap belts in 26 frontal crashes. Safety Study NTSB/SS-86/03. Washington, DC.

<sup>4</sup> Campbell, K.L.; Sullivan, K.P. 1991. Heavy truck cab safety study. UMTRI-91-28. Ann Arbor, MI: The University of Michigan Transportation Research Institute.

<sup>5</sup> Ranney, T. 1982. Injury causation and heavy truck occupant crash protection. In: Proceedings, 26th annual conference of the American Association for Automotive Medicine. Arlington Heights, Illinois.

These and other studies show that lap/shoulder belts save lives, and more lives could be saved if more drivers used these restraints. In 1982, the NHTSA sponsored an observational study of restraint use by drivers of heavy trucks.<sup>6</sup> Visual inspections of belt use for 4,354 drivers were made at four weigh stations in four States. Only 272 drivers (6.3 percent) wore belts. A 1991 follow up study, using the same visual inspection method, found that of the 4,758 drivers observed, 2,611 (54.7 percent) were wearing belts.<sup>7</sup> However, only about 38 percent of the drivers wearing belts (about 21 percent of all the drivers) were wearing lap/shoulder belts.<sup>8</sup>

Although the 1991 NHTSA study found that nearly 55 percent of the drivers observed were wearing belts, restraints were used in only about 8 percent of the accidents (for which belt use could be determined) investigated by the Safety Board for its 1990 safety study.<sup>9</sup> The large difference in belt use rates suggests that (a) the accident investigation data reported by the Safety Board in 1990 are not indicative of the rate of belt use found in 1991, or (b) belt use is less common among drivers sustaining fatal injuries than among drivers in general, or (c) the 1991 NHTSA study is flawed,<sup>10</sup> or (d) some combination of these factors existed. Regardless of the reason for the disparity in reported belt use rate, the results of the NHTSA observational studies and the Safety Board study nevertheless indicate that a large number of heavy truck drivers do not use seatbelts.

During a crash, the occupant compartment of a heavy truck becomes a dangerous environment. Drivers can be injured by the steering assembly or by other interior controls and surfaces. Further, excessive roof crush, especially in rollover accidents, is a major contributor to cab space intrusion. In addition, many drivers are ejected from their vehicles.

The patterns of injury in heavy truck accidents are complex, and study is needed to determine the need for and feasibility of countermeasures. The

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<sup>6</sup> Allison, P.; Tarkir, R. 1982. Heavy truck occupant restraint use. DOT Technical Report prepared under contract No. DTNH-22-81-C-07075.

<sup>7</sup> Copenhaver, M.; Wilkinson, T. 1991. Heavy truck occupant restraint use. DOT-HS-807-752. Washington, DC: National Highway Traffic Safety Administration.

<sup>8</sup> This percentage was calculated from tabular data in the report; it is not stated in the report.

<sup>9</sup> Data for this study were collected in 1987 and 1988.

<sup>10</sup> The observers in both NHTSA-sponsored surveys did not record data for a vehicle if belt use was uncertain. A recent report by the Insurance Institute for Highway Safety (IIHS Status Report, vol. 26, no. 11, December 31, 1991, p. 4) suggests that seatbelt use studies that rely on this kind of methodology may be biased and may overestimate actual use.

Federal Highway Administration (FHWA) is currently sponsoring a project to develop heavy truck crash testing methods. The Safety Board supports the efforts of the FHWA to develop heavy truck crash testing methods and looks forward to the results.

The Safety Board recognizes that lap/shoulder belts will not provide life-saving protection for all heavy truck crashes, especially those with excessive cab space intrusion. However, lap/shoulder belts are a generally proven countermeasure against injury, and are easy to use.

All heavy trucks manufactured in the United States on or after September 1, 1990, are required by Federal Motor Vehicle Safety Standard 208 (FMVSS 208), "Occupant Crash Protection" (as amended in May 1990), to be equipped with "safety belts" (either lap-only belts or lap/shoulder belts) that meet all strength requirements set for such systems on passenger cars. Further, the amended FMVSS also requires the implementation of certain technical advancements intended to make the belts more comfortable and easier to use in the rough riding environment in a heavy truck. For example, locking retractors will be attached to suspension seats (where present) for improved comfort; these retractors will also keep the belt from progressively tightening around the wearer or from becoming dirty or tangled during periods of nonuse. The amended FMVSS will result in some degree of improvement in belt design for newly manufactured heavy trucks, but it still does not require the installation of lap/shoulder belts in these vehicles. Lap-only belts continue to satisfy the requirements of FMVSS 208 for heavy trucks.

Safety Board staff attempted to determine how many heavy trucks currently in service are equipped with lap/shoulder belts, but no such data could be found. The NHTSA has indicated that it has no plans to require the installation of lap/shoulder belts in heavy trucks because it reports that manufacturers are now voluntarily installing them as standard equipment on newly manufactured trucks; NHTSA noted that 90 to 95 percent of heavy trucks manufactured in 1990 were equipped with lap/shoulder belts.<sup>11</sup> As aging vehicles are retired from service each year, carriers will likely replace most of the retired units in their fleets with newly manufactured vehicles that are equipped with lap/shoulder belts. Consequently, the number of lap/shoulder belt-equipped heavy trucks in service can be expected to increase. The Safety Board is pleased that most manufacturers have already taken positive action to equip their heavy trucks with lap/shoulder belts; however, the Board will continue to monitor this issue to determine if the installation of lap/shoulder belts in heavy trucks should be required.

The FHWA has taken action to increase the use of seatbelts by commercial vehicle drivers. Under 49 CFR 392.16, the FHWA requires that "a motor vehicle which has a seat belt assembly installed at the driver's seat shall not be driven unless the driver has properly restrained himself with the seat belt." According to the motor carrier safety regulations (49 CFR 350.11), States must adopt Federal motor carrier safety rules to receive Motor Carrier

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<sup>11</sup> Letter dated January 31, 1992 to the Chairman of the NTSB from the Administrator of the NHTSA responding to Safety Recommendation H-90-75.

Safety Assistance Program (MCSAP) grant funds. FHWA staff report that 48 States have adopted Federal regulations that include 49 CFR 392.16, the Federal seatbelt use requirement.

Although the intent of the FHWA regulation 49 CFR 392.16 was to increase seatbelt use by drivers, evidence previously discussed indicates that the lack of restraint use by truck drivers continues to be a problem. Because a requirement exists for commercial drivers to wear restraints, it appears that the lack of seatbelt use by drivers of heavy trucks is related to a lack of enforcement of this regulation and a lack of education regarding the importance of seatbelt use.

The FHWA is the Federal agency responsible for the enforcement of 49 CFR 392.16. According to FHWA and the Commercial Vehicle Safety Alliance (CVSA), an association of State and Provincial officials responsible for administration and enforcement of motor carrier safety laws in the United States, Canada and Mexico, enforcement of seatbelt use is not a current inspection priority. Inspections of the driver, vehicle and load are primarily directed toward violations that may put the driver out of service, such use of alcohol or drugs, poorly adjusted brakes, and hours of service violations. The CVSA also noted that observation of driver seatbelt use is difficult because motor carrier inspectors are typically unable to observe seatbelt use when trucks are stopped for inspection, and drivers may have already unbuckled their seatbelts by the time the inspector arrives at the cab. Despite these difficulties, the Safety Board believes that more active enforcement of 49 CFR 392.16 would help save lives and reduce injuries and that the FHWA and the CVSA should actively pursue methods to improve enforcement of this regulation. Because of its role in the enforcement of all highway safety regulations, including mandatory seatbelt use laws, the Safety Board also believes that the International Association of Chiefs of Police should include truck drivers in its safety belt use enforcement efforts.

Surveys have suggested that some truck drivers do not believe that restraint systems will afford them a measurable degree of protection in the event of a crash.<sup>12</sup> Some believe that it is best to be thrown from a vehicle in an accident. Although there is clear evidence that restraint use saves lives, some truck drivers apparently believe this to be true only for passenger vehicles. Such beliefs among truck drivers highlight the need for improved education regarding restraint use.

Media and educational campaigns for restraint use have been directed primarily to drivers of automobiles; however, programs are now being developed and conducted for truck drivers. The NHTSA, in cooperation with the FHWA, is currently drafting a set of educational materials for this purpose. The package of educational materials, "Safety Belt Use in Large Trucks," is planned for completion in summer 1992, and will be distributed to

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<sup>12</sup> Clarke, R.M.; Leasure, W.A., Jr., 1986. Truck occupant protection. NHTSA Technical Report DOT-HS-807-081. Washington, DC: National Highway Traffic Safety Administration.

major carriers, driver training programs, unions, and other organizations whose memberships include truck drivers. The material under development is directed to trucking supervisors, executives and safety professionals. Although the package does not specifically mention lap/shoulder belts, it contains forms, fact sheets, and other tools that can be used to educate drivers on the importance of wearing seatbelts. The Safety Board commends the efforts of the NHTSA and the FHWA to develop educational material on restraint use for truck drivers and urges the NHTSA and the FHWA (a) to include in the package information about the importance of wearing lap/shoulder belts, and (b) to expedite the dissemination of this material upon its completion. The Board further hopes that this will be an ongoing effort to educate truck drivers and thus urges the NHTSA and the FHWA to establish methods to supplement and revise the educational package as needed.

Although many truck drivers still enter the profession with little or no formal training, discussions with industry representatives indicate that more new drivers receive structured training than in past years.<sup>13</sup> The Professional Truck Drivers Institute of America's (PTDIA) approved curriculum specifies that drivers should be instructed to use available protective equipment. Drivers are informed that "Seat belts give protection and should always be worn."<sup>14</sup> The Safety Board is pleased that the PTDIA includes seatbelt information in its curriculum, but the Board believes that the Institute should ensure that the driver training programs which they certify specifically instruct student drivers on the importance of using lap/shoulder belts.

In its 1982 and 1991 restraint use surveys, the NHTSA noted that certain carriers--those with active incentive programs--had noticeably higher usage rates than carriers without incentive programs. The NHTSA noted that 87.3 percent of United Parcel Service (UPS) drivers observed during NHTSA's 1991 study were wearing seatbelts. A UPS safety professional indicated to Safety Board staff that UPS has worked to create a climate in which belt use as a safety concept permeates all levels of the company. He said that managers remind each other to wear belts in their personal vehicles, and they attempt to "sell" each of their drivers on belt use as well. Supervisors who see unbelted drivers seek a "commitment" from these drivers regarding future belt use. Repeat offenders are dealt with using progressively stronger techniques. UPS credits its successful belt use program on its continuous, positive educational message combined with disciplinary action when necessary. The Safety Board would like to see more carriers implement such programs.

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<sup>13</sup> This may be due, in part, to the requirements of the commercial drivers license that became mandatory April 1, 1992, for drivers of trucks of at least 26,000 pounds gross vehicle weight.

<sup>14</sup> Professional Truck Driver Institute of America. Tractor-Trailer Driver Curriculum: The units of instruction and their requirements.

Therefore, the National Transportation Safety Board recommends that the Professional Truck Drivers Institute of America:

Ensure that the driver training programs certified by the Institute instruct student drivers on the importance of using lap/shoulder belts. (Class II, Priority Action) (H-92-29)

The Safety Board also issued recommendations related to restraint use by heavy truck drivers to the Commercial Vehicle Safety Alliance, the National Highway Traffic Safety Administration, the Federal Highway Administration, the International Association of Chiefs of Police, the American Trucking Associations, the Alliance of American Insurers, the American Insurance Association, and the National Association of Independent Insurers.

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility "...to promote transportation safety by conducting independent accident investigations and formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is vitally interested in any actions taken as a result of its safety recommendations and would appreciate a response from you regarding action taken or contemplated with respect to the recommendation in this letter. Please refer to Safety Recommendation H-92-29 in your reply.

Acting Chairman COUGHLIN, and Members LAUBER, HART, HAMMERSCHMIDT, and KOLSTAD concurred in this recommendation.



By: Susan M. Coughlin  
Acting Chairman